



3801 E. Florida Avenue
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September 29, 2023

Castle Rock Water
ATTN: Stormwater
175 Kellogg Ct.
Castle Rock, CO 80109

**Re: Perry Street – South Street Social
Project Number: SDP23-0019
Final Drainage Compliance Letter**

EES is pleased to provide a drainage letter of conformance for the proposed site layout for Lot 4A, Block 11 of the town of Castle Rock, more specifically located at 414 and 405 North Perry Street, and 411 4th Street, Castle Rock, Colorado. The proposed project site is approximately 0.40 acres and is located at the northeast corner of 4th Street and Perry Street intersection. The site is bound to the north by a residential single-family home, Perry Street to west, and 4th Street to the south and east. In the existing condition, the site has 3 main buildings, two commercial stores to the south (1,065-sf and 2,508-sf), and a two-story residence building (1,340-sf) to the north. Additionally, there is an approximate 5,521-sf overhead canopy with steel frames in the center of the property that will be removed as a part of this project. The existing conditions also has associated sidewalks, underground utilities, step walls, rockscaping, and landscaping on site. The existing drainage patterns were analyzed as three (3) existing drainage basins herein referred to as H-1, H-2, and H-3.

Per the NRCS Soil Survey, the subsurface characteristics consist of Bresser-Truckton sandy loam at 5-25% slopes. The soils have a moderate infiltration rate and are defined as hydrological soil group B. Refer to the Appendix for the NRCS Soil Survey Map.

There are no recently reported cases of flooding within or around the development. The site is located within Zone "X", areas determined to be outside 0.2% annual chance floodplain, of the Flood Plain, as designated on the Flood Insurance Rate Map (FIRM) 08035C0301G, map last revised 03/16/2016. Refer to the Appendix for the FIRMette.

BASIN H-1 – Basin H-1 is the 0.14 acres on the eastern portion of the existing parcel. The impervious value for the basin is 87%. The 5-year and 100-year runoff coefficients are 0.74 and 0.83, respectively. The runoff for the 5-year and 100-year storm event are 0.49-cfs and 1.00-cfs, respectively. Historically, runoff sheet flows to the east into the 4th Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

BASIN H-2 – Basin H-2 is 0.16 acres on the western portion of the existing parcel. The impervious value for the basin is 60%. The 5-year and 100-year runoff coefficients are 0.50 and 0.66, respectively. The runoff for the 5-year and 100-year storm event are 0.40-cfs and 0.95-cfs, respectively. Historically, runoff sheet

flows to west into the Perry Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

BASIN H-3 – Basin H-3 is 0.10 acres on the southern portion of the existing parcel. The impervious value for the basin is 81%. The 5-year and 100-year runoff coefficients are 0.68 and 0.78, respectively. The runoff for the 5-year and 100-year storm event are 0.32-cfs and 0.68-cfs, respectively. Historically, runoff sheet flows to the south into the 4th Street Right-Of-Way. Once in the Right-Of-Way the flow is captured by an existing public storm sewer infrastructure within the R.O.W.

EXISTING RUNOFF SUMMARY TABLE							
DESIGN POINT	TRIBUTARY BASIN	AREA (AC)	PERCENT IMPERVIOUS	COEFFICIENT		TOTAL RUNOFF	
				C5	C100	Q5 (CFS)	Q100 (CFS)
1	H-1	0.14	87%	0.74	0.83	0.49	1.00
	H-2	0.16	60%	0.50	0.66	0.40	0.95
	H-3	0.10	81%	0.68	0.78	0.32	0.68
Total Existing Parcel		0.40	74%	0.62	0.73	1.21	2.62

The proposed redevelopment of the area will include the demolition of the northern residential building and the existing pavilion canopy to construct a 2,754-sf tap house with 2,032-sf basement (storage only/non-occupiable). The southwestern commercial building (405 N. Perry Street) will have the back portion of it demolished and an addition will be added to the building, resulting in a 1,400-sf restaurant and bar area. The southeast building (411 N. 4th St) will be redeveloped as a three-level container food service with a total square footage of 2,937-sf restaurant. Sidewalks and rockscape on site are to be removed and replaced with pavers and landscaping. Drainage patterns have been analyzed as seven (7) proposed drainage basins for comparison to the existing conditions.

BASIN P-1 – Basin P-1 is 0.07 acres and consists primarily of the proposed tap room (northern building) and concrete. The impervious value for the basin is 91%. The 5-year and 100-year runoff coefficients are 0.77 and 0.85, respectively. The runoff for the 5-year and 100-year storm event are 0.26-cfs and 0.53-cfs, respectively. Basin runoff will be captured by roof gutter and release at surface grade near the northeast corner of the building towards the alley. Surface runoff will then be conveyed by the alley into N. 4th Street curb and gutter then will be routed and captured by the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-2 – Basin P-2 is 0.01 acres and consists of the uncovered sidewalk/concrete area on the south side of the tap house (northern building) and north of the pavilion canopy. The impervious value for the basin is 100%. The 5-year and 100-year runoff coefficients are 0.86 and 0.93, respectively. The runoff for the 5-year and 100-year storm event are 0.04-cfs and 0.08-cfs, respectively. Basin runoff will be minimal



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in this area and captured by a proposed 8" ADS slotted drain pipe that conveys the captured runoff to a proposed 5' manhole where it then is conveyed through an 18" RCP to the existing 12" HDPE public storm sewer within the Alley right-of-way. The connection to the 12" HDPE pipe will be within a proposed 5' manhole. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the proposed slotted drain becomes clogged, runoff will pond overtop and surface drain to the east and into the Alley right-of-way and eventually to the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street. If the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-3 – Basin P-3 is 0.14 acres and consists of the picnic area that previously was under the pavilion canopy and sidewalk areas between 405 N. Perry Street and 411 N. Perry Street. The impervious value for the basin is 97%. The 5-year and 100-year runoff coefficients are 0.83 and 0.91, respectively. The runoff for the 5-year and 100-year storm event are 0.57-cfs and 1.15-cfs, respectively. Basin runoff will be captured by a proposed 8" ADS slotted drainpipe that conveys the captured runoff to a proposed 5' manhole where it then is conveyed through an 18" RCP to the existing 12" HDPE public storm sewer within the Alley right-of-way. The connection to the 12" HDPE pipe will be at within a proposed 5' manhole. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-4 – Basin P-4 is 0.04 acres and consists of the uncovered sidewalk/concrete area on the south side of the container building (southeast building) and the container plaza area. The impervious value for the basin is 95%. The 5-year and 100-year runoff coefficients are 0.83 and 0.91, respectively. The runoff for the 5-year and 100-year storm event are 0.17-cfs and 0.34-cfs, respectively. Basin runoff will be minimal in this area and captured by a proposed 8" ADS slotted drainpipe that conveys the captured runoff to a proposed 5' manhole where it then is conveyed through an 18" RCP to the existing 12" HDPE public storm sewer within the Alley right-of-way. The connection to the 12" HDPE pipe will be within a proposed 5' manhole. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the proposed slotted drain becomes clogged, runoff will pond overtop and surface drain to the east and into the Alley right-of-way and eventually to the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street. If the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-5 – Basin P-5 is 0.03 acres and consists of the southern portion of the container plaza and southern edge of the proposed site, in addition to the southeastern portion of the 405 N. Perry Street structure as well as surrounding perimeter landscaping and sidewalk. The impervious value for the basin is 54%. The 5-year and 100-year runoff coefficients are 0.45 and 0.68, respectively. The runoff for the 5-year and 100-year storm event are 0.07-cfs and 0.18-cfs, respectively. Portions of the basin runoff reaching the structures will be captured by roof gutters and release at surface grade near the south side of the site towards N. 4th Street. Basin runoff within the landscape and sidewalk will surface flow south



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towards N. 4th Street. Once the basin runoff is in N. 4th Street, the curb and gutter will convey the runoff to the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street where runoff will be fully captured. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-6 – Basin P-6 is 0.09 acres and consists of the western portion of the picnic area canopy, eastern portion of the southwest building (405 N. Perry Street) as well as surrounding perimeter landscaping and concrete. The impervious value for the basin is 38%. The 5-year and 100-year runoff coefficients are 0.32 and 0.61, respectively. The runoff for the 5-year and 100-year storm event are 0.12-cfs and 0.43-cfs, respectively. Portions of the basin runoff reaching the structures will be captured by roof gutters and release at surface grade near the west side of the site towards Perry Street. Basin runoff within the landscape and sidewalk will surface flow west towards Perry Street. The portion of landscape area north of 414 N. Perry Street will have a 6' grass lined swale to flow water towards the west. Once the basin runoff is in Perry Street, the curb and gutter will convey the runoff to the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street where runoff will be fully captured. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

BASIN P-7 – Basin P-7 is 0.01 acres and consists on concrete area east of the proposed container building (411 N. 4th Street). The impervious value for the basin is 100%. The 5-year and 100-year runoff coefficients are 0.86 and 0.93, respectively. The runoff for the 5-year and 100-year storm event are 0.05-cfs and 0.09-cfs, respectively. Basin runoff will sheet flow east towards the alley. Surface runoff will then be conveyed by the alley into N. 4th Street curb and gutter then will be routed and captured by the existing Type 16 inlet located at the northeast corner of the intersection of N. 4th Street and Perry Street. The existing public storm sewer infrastructure will convey the runoff as it does in the existing condition. In the event that the existing inlet becomes clogged, runoff will pond in the right-of-way and emergency overflow path will direct runoff to the west within N. 4th Street.

PROPOSED RUNOFF SUMMARY TABLE							
DESIGN POINT	TRIBUTARY BASIN	AREA (AC)	PERCENT IMPERVIOUS	COEFFICIENT		TOTAL RUNOFF	
				C5	C100	Q5 (CFS)	Q100 (CFS)
P-1	P-1	0.07	91%	0.77	0.85	0.26	0.53
	P-2	0.01	100%	0.86	0.93	0.04	0.08
	P-3	0.14	97%	0.83	0.91	0.57	1.15
	P-4	0.04	95%	0.81	0.88	0.17	0.34
	P-5	0.03	54%	0.45	0.68	0.07	0.18
	P-6	0.09	38%	0.32	0.61	0.12	0.43
	P-7	0.01	100%	0.86	0.93	0.05	0.09
Total Proposed Parcel		0.40	76%	0.65	0.79	1.30	2.86



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As described above, in the existing condition the 0.40-acre parcel is 74% impervious and produces 1.21 cfs and 2.62 cfs in the 5-year and 100-year storm events respectively. In the developed condition, the 0.40-acre project site is 76% impervious and produces 1.30 cfs and 2.86 cfs in the 5-year and 100-year storm events respectively. Although there is a slight increase of both imperviousness and resultant flow from the redevelopment, due to reseeding and updating the existing conditions to newer landscape standards, the amount of flow off-site will be negligible. Additionally, a majority of flows on-site will be directly piped into existing infrastructure, reducing the total sheet flow coming off site. All the main walks through the site have been proposed as pavers to allow additional infiltration through the soil below instead of running off-site. Therefore, compared to the existing conditions of poorly maintained paver walks and rockscape areas have been improved and no negative effects will result downstream of the existing conditions.

Drainage Design Criteria

As outlined in the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, the design rainfall was found using National Oceanic and Atmospheric Administration, Precipitation-Frequency Atlas of the United States, Volume II-Colorado (NOAA Atlas 1973), published in 1973. The design rainfall at the proposed site was found to be 1.43 and 2.60 inches for the 5-year and 100-year storms, respectively.

Intensity was calculated using the following calculation:

$$I = \frac{28.5 P_1}{(10 + T_c)^{0.786}}$$

Where:

I = rainfall intensity (inches per hour)

P₁ = 1.43 - 5yr and 2.60 - 100 yr one-hour rainfall depth (inches) per NOAA shown above.

T_c = time of concentration (minutes)

The Rational Method was used to calculate runoff values for the 5-year and 100-year design storms.

Q=CIA

Where:

Q = peak discharge (cfs)

C = runoff coefficient

I = rainfall intensity (inches/hour)

A = drainage area (acres)

The runoff coefficients used in the calculation method are from UDFCD Manual, Runoff Coefficients for Rational Method.

Hydrological Criteria



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The analysis and design of the Stormwater management system for this project was prepared in accordance with the criteria set forth in the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual (SDDTCM), dated June 2019. The Rational Method was used to calculate runoff from the 5-year and 100-year design storm recurrence intervals.

The proposed public storm sewer system was evaluated for capacity by developing the hydraulic grade lines (HGL's) for the 100-year storm event using the Bentley Systems, Inc – StormCAD Connect Edition 10.02.01.04, which is an accepted program widely used throughout the U.S for design of storm sewer systems. The 100-year design criteria used is to contain the HGL 1' below the finish grade and within the storm structures.

Manufacturer specifications for the slotted drain were utilized to confirm the capacity of the 8" slotted drain. Per the specifications provided in the appendix of this report, the slotted inlet will handle a minimum of 0.04 cfs/foot of slot lengths. Based on this calculation 2-feet of slotted pipe is required for each drainage basin to provide the required amount. Significantly more has been provided to allow for clogging factor.

According to the FEMA Flood Insurance Rate Maps (FIRM), the flood map for the selected area is number 08035C0301G, effective date March 16, 2016. The entire area of the project site is located in an "Area of Minimal Flood Hazard – Zone X". The FIRMette Map is included within the Appendix of this report.

The proposed development and subsequent lot developments will follow the "Four Step Process" as mandated by the Drainage Criteria Manual as follows:

Stormwater Quality Design Four Step Process

The proposed development and subsequent lot developments will follow the "Four Step Process" as mandated by the Drainage Criteria Manual as follows:

Step 1: Reduce Runoff Volume to the Maximum Extent Practicable

Runoff has been limited to the maximum extent practicable by utilizing a paver system and roof drain connections to underground storm sewer and reduce the amount of runoff.

Step 2: Provide Water Quality Capture Volume and Flood Control Detention Via Full-Spectrum Detention

Due to existing site size and minimal increase to the developed runoff water quality and detention modifications are not required. Additionally, a majority of flows on-site will be directly piped into existing infrastructure, reducing the total sheet flow coming off site. All the main walks through the site have been proposed as pavers to allow additional infiltration in order the soil below instead of running off-site.



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Step 3: Utilize Stream Channel Stabilization Techniques

There are no drainageways adjacent to this project site or onsite.

Step 4: Undertake Source Control

During initial construction, erosion control measures (CCMs) including vehicle tracking control, stabilized staging area, construction fence, and silt fence will be in place to provide source control of sediment within the site. During interim conditions, inlet protection and rock socks will be installed at proposed inlets and along the proposed curb and gutter within the site. The final condition will provide permanent seeding of all disturbed areas provided per permanent CCM requirements. No other potential pollutants are anticipated with this site post- construction.

In addition to the source control measures associated with construction, there are additional measures to be in place with the developed condition. The trash enclosure located at 411 4th Street will be below the 2nd level limiting any runoff from reaching the trash area. In addition, slotted drains will be utilized throughout the site that will have grates that will limit large debris from entering the storm system. During a snowstorm event, the snow will be shoveled into the provided landscape areas to promote infiltration. The site will also utilize general good housekeeping practices and preventative maintenance.

Operation and Maintenance

All operations and maintenance of stormwater controls on-site are to be done by the property owner. General maintenance for all stormwater lines and manholes are to follow the standards set forth within the *Stormwater Management Facility Operation and Maintenance (O&M) General Guidelines*, prepared by the Town of Castle Rock – Castle Rock Water. EES reached out to ADS on general maintenance of ADS structures, as there is no general maintenance manual. Their suggestions for the trench drain was the following:

- We recommend a min. pipe slope of 0.5%. That is the industry standard for slot drains and trench drains to be considered “self-cleaning”
- The grates should be inspected on a regular basis. More frequently if expecting potential clogging from soils, leaves, trash. Less frequently for applications like loading docks, interstates, self storage facilities
- We recommend assuming a clogging factor to help mitigate amount of maintenance required. A typical value would be 50% clogging.

The proposed design takes all these items into account, the owner should regularly check the trench drains for clogging.

All operation and maintenance of the proposed ADS storm structures are to follow the maintenance guidelines provided within the appendix of this report. Storm lines and ADS should be checked



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approximately every 5 years for issues within the system, per the EPA. ADS trench drains are to be checked for clogs within the grate after major storm events or bi-yearly.

Respectfully submitted,
Entitlement and Engineering Solutions, Inc

Krysta Houtchens

Krysta Houtchens, P.E.
Associate/Sector Lead



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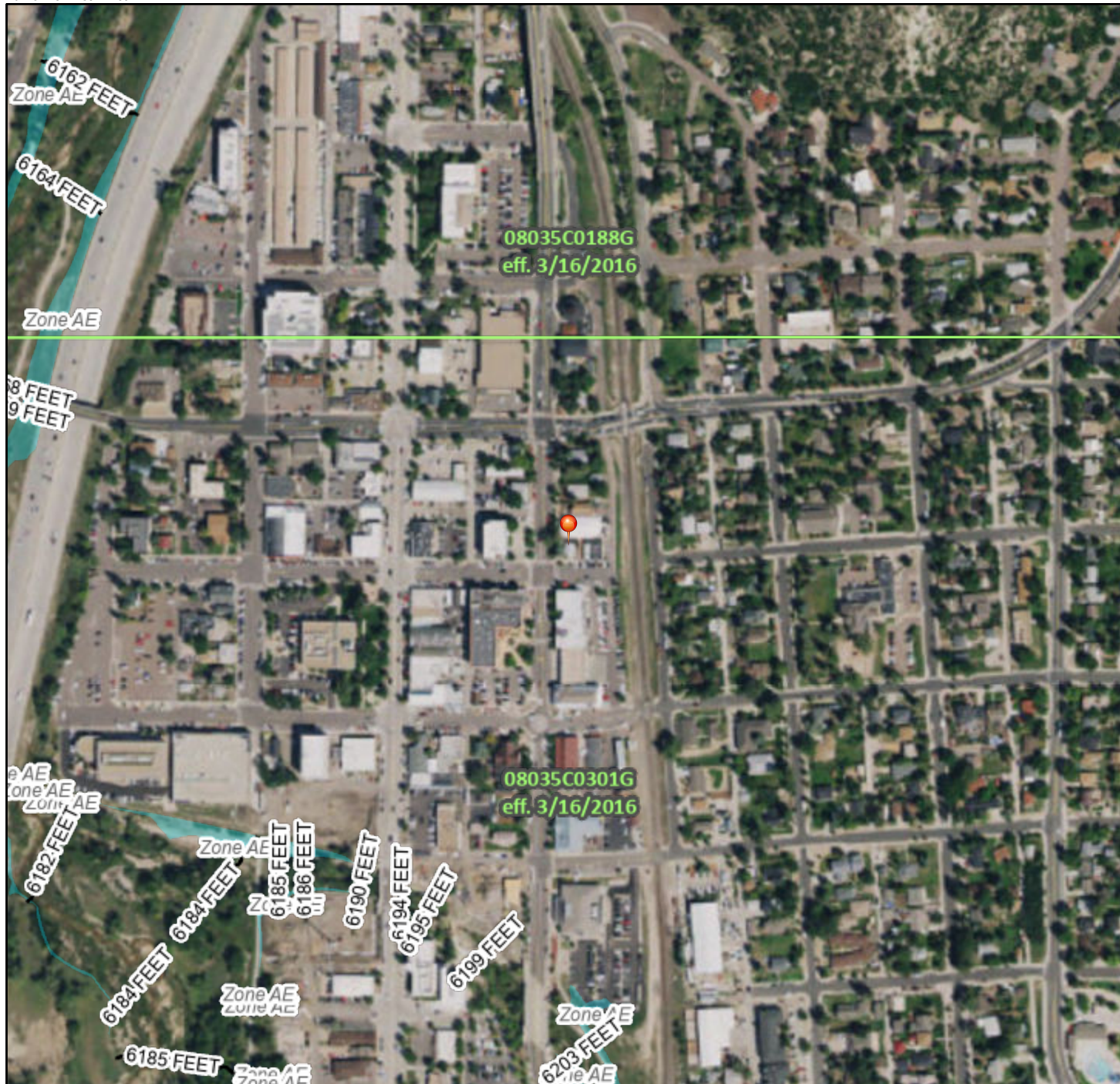
APPENDIX A

FIRM Map, Hydrologic Soil Map

National Flood Hazard Layer FIRMette



104°51'49"W 39°22'39"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/12/2022 at 3:07 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Hydrologic Soil Group—Castle Rock Area, Colorado



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
 Survey Area Data: Version 14, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 24, 2018—Nov 19, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	B	0.5	100.0%
Totals for Area of Interest			0.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



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APPENDIX B

Hydrology Calculations (Existing & Developed)

Runoff Coefficients

Corridor / Design Package: Perry Street Social District

System Name: Existing and Developed Condition

Computed: KMH

Checked: KMH

Date: 12/29/2022

Date: 12/29/2022

Sub-Basin Data			Composite C			Sub Area (Pavement)				Sub Area (Roof)				Sub Area(Lawns B Group soils) 2-7%,>7%				Sub Area(Gravel)			
Basin ID	Description	Total Area (ac)	C ₅	C ₁₀₀	i	C ₅	C ₁₀₀	i	Area (ac)	C ₅	C ₁₀₀	i	Area (ac)	C ₅	C ₁₀₀	i	Area (ac)	C ₅	C ₁₀₀	i	Area (ac)
H-1	East	0.14	0.74	0.83	87	0.86	0.89	100	0.04	0.76	0.84	90	0.09	0.01	0.44	2	0.00	0.32	0.61	40	0.01
H2	West	0.16	0.50	0.66	60	0.86	0.89	100	0.02	0.76	0.84	90	0.08	0.01	0.44	2	0.04	0.32	0.61	40	0.02
H-3	South	0.10	0.68	0.78	81	0.86	0.89	100	0.02	0.76	0.84	90	0.07	0.01	0.44	2	0.01	0.32	0.61	40	0.00
E-Total	Total Site	0.40	0.62	0.73	74.3	0.86	0.89	100	0.07	0.76	0.84	90	0.24	0.01	0.44	2	0.05	0.32	0.61	40	0.03
P-1	North Building	0.07	0.77	0.85	91.0	0.86	0.93	100	0.007	0.76	0.84	90	0.06	0.01	0.44	2	0.000	0.32	0.61	40	0.00
P-2	Sidewalk Area south of northern building	0.01	0.86	0.93	100.0	0.86	0.93	100	0.01	0.76	0.84	90	0.00	0.01	0.44	2	0.00	0.32	0.61	40	0.00
P-3	Picnic Area and Central Site	0.14	0.83	0.91	96.6	0.86	0.93	100	0.14	0.76	0.84	90	0.00	0.01	0.44	2	0.01	0.32	0.61	40	0.00
P-4	Container Plaza	0.04	0.81	0.88	94.9	0.86	0.93	100	0.02	0.76	0.84	90	0.02	0.01	0.44	2	0.00	0.32	0.61	40	0.00
P-5	South Sidewalk & structure	0.03	0.45	0.68	54.0	0.86	0.93	100	0.00	0.76	0.84	90	0.01	0.01	0.44	2	0.01	0.32	0.61	40	0.00
P-6	West Side of Site	0.09	0.32	0.61	37.9	0.86	0.93	100	0.02	0.76	0.84	90	0.02	0.01	0.44	2	0.06	0.32	0.61	40	0.00
P-7	East side of Container Plaza	0.01	0.86	0.93	100.0	0.86	0.93	100	0.01	0.76	0.84	90	0.00	0.01	0.44	2	0.00	0.32	0.61	40	0.00
P-Total	Total Site	0.40	0.65	0.79	76.2	0.86	0.93	100	0.20	0.76	0.84	90	0.11	0.01	0.44	2	0.07	0.32	0.61	40	0.00

C and I values taken from Table 63 of the UDFCD

Standard Form SF-1 . Time of Concentration

Corridor / Design Package: Perry Street Social District
System Name: Existing and Developed Condition

Computed: KMH
Checked: KMH
Date: 6/18/2021

Urban TOC_{min} = 5 min
Rural TOC_{min} = 10 min

	SUB-BASIN DATA			INITIAL/OVERLAND FLOW			TRAVEL TIME									Tc CHECK				FINAL Tc (min)
				(t _o)			(t _t)									(Urbanized basins)				
									Type of Land Surface				t _t Travel Time (min)	TOTAL						
Basin ID	Description	Area (ac)	C _s	Length (ft)	Slope (ft/ft)	t _o (min)	Length (ft)	S _w (ft/ft)	Code	Description	Convey Coef (C _v)	Velocity (ft/s)	t _t Travel Time (min)	t _c = t _i + t _t (min)	Urban (Yes /No)	Length (ft)	T _{c max} (min)	Tc _{max} > t _c		
H-1		0.14	0.74	20	0.022	2.24	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	2.24	YES	20.00	0.17	Regional Tc	5.00	
H2		0.16	0.50	20	0.020	3.83	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	3.83	YES	20.00	0.17	Regional Tc	5.00	
H-3		0.10	0.68	20	0.020	2.68	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	2.68	YES	20.00	0.17	Regional Tc	5.00	
P-1		0.07	0.77	20	0.020	2.12	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	2.12	YES	20.00	0.17	Regional Tc	5.00	
P-2		0.01	0.86	5	0.020	0.77	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	0.77	YES	5.00	0.08	Regional Tc	5.00	
P-3		0.14	0.83	45	0.020	2.60	50	0.02	6	Paved areas and shallow paved swales	20.00	2.83	0.29	2.89	YES	95.00	0.58	Regional Tc	5.00	
P-4		0.04	0.81	10	0.020	1.32	0	0	6	Paved areas and shallow paved swales	20.00	0.00	0.00	1.32	YES	10.00	0.11	Regional Tc	5.00	
P-5		0.03	0.45	10	0.020	2.93	20	0.015	6	Paved areas and shallow paved swales	20.00	2.45	0.14	3.07	YES	30.00	0.22	Regional Tc	5.00	
P-6		0.09	0.32	45	0.020	7.53	20	0.02	6	Paved areas and shallow paved swales	20.00	2.83	0.12	7.64	YES	65.00	0.42	Regional Tc	7.64	
P-7		0.01	0.86	25	0.020	1.72	0	0.02	6	Paved areas and shallow paved swales	20.00	2.83	0.00	1.72	YES	25.00	0.19	Regional Tc	5.00	

Velocity from $V = C_v \cdot S_w^{0.5}$, from MHFD Eqn RO-4, C_v from Table 6-5 (See Sheet Design Info)
 $t_t = L/60V$, from MHFD Eqn 6-4
 $t_{c \text{ max}} = 10 + L/180$, from MHFD Eqn 6-5
Final Tc > 10 min for nonurban watersheds

Code	Description
1	Heavy meadow
2	Tillage/field
3	Short pasture and lawns
4	Nearly bare ground
5	Grassed waterway
6	Paved areas and shallow paved swales
7	Rail Ballast

Standard Form SF-2 . Storm Drainage System Design (Rational Method Procedure)

Corridor / Design Package: Perry Street Social District
System Name: Existing and Developed Condition

Computed: KMH Date: 12/29/2022
Checked: KMH Date: 12/29/2022

Design Storm: Proposed 5-yr P = 1.43 in

LOCATION		DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
			AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c (MIN)	C.A. (AC)	IIN / HR	Q (CFS)	t _c (MIN)	SUM (C*A)(AC)	I(IN / HR)	Q(CFS)	SLOPE(%)	STREETFLOW (C)	DESIGNFLOW (C)	SLOPE(%)	PIPE SIZE(in)	LENGTH(FT)	VELOCITY(FPS)	t _t (MIN)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
H-1	East		H-1	0.14	0.74	5.00	0.101	4.85	0.49					--	--	--	--	--	--	--		
H2	West		H2	0.16	0.50	5.00	0.082	4.85	0.40					--	--	--	--	--	--	--		
H-3	South		H-3	0.10	0.68	5.00	0.067	4.85	0.32													
E-Total	Total Site	EX-1	E-Total	0.40						5.00	0.250	4.85	1.21									
P-1	North Building		P-1	0.07	0.77	5.00	0.054	4.85	0.26					--	--	--	--	--	--	--		
P-2	Sidewalk Area south of northern building		P-2	0.01	0.86	5.00	0.008	4.85	0.04													
P-3	Picnic Area and Central Site		P-3	0.14	0.83	5.00	0.119	4.85	0.57													
P-4	Container Plaza		P-4	0.04	0.81	5.00	0.035	4.85	0.17													
P-5	South Sidewalk & structure		P-5	0.03	0.45	5.00	0.014	4.85	0.07													
P-6	West Side of Site		P-6	0.09	0.32	7.64	0.029	4.27	0.12													
P-7	East side of Container Plaza		P-7	0.01	0.86	5.00	0.010	4.85	0.05													
P-Total	Total Site	P-1	P-Total	0.40						5.00	0.27	4.85	1.30									

Proposed 100-yr P = 2.60 in

LOCATION		DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
			AREA DESIGN	AREA (AC)	RUNOFF COEFF	t _c □ (MIN)	C.A. (AC)	IIN / HR	Q (CFS)	t _c □ (MIN)	SUM (C*A)(AC)	I(IN / HR)	Q(CFS)	SLOPE(%)	STREETFLOW (C)	DESIGNFLOW (C)	SLOPE(%)	PIPE SIZE(in)	LENGTH(FT)	VELOCITY(FPS)	t _t (MIN)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
H-1	East		H-1	0.14	0.83	5.00	0.114	8.82	1.00					--	--	--	--	--	--	--		
H2	West		H2	0.16	0.66	5.00	0.107	8.82	0.95					--	--	--	--	--	--	--		
H-3	South		H-3	0.10	0.78	5.00	0.077	8.82	0.68													
E-Total	Total Site	EX-1	E-Total	0.40						5.00	0.30	8.82	2.62									
P-1	North Building		P-1	0.07	0.85	5.00	0.060	8.82	0.53					--	--	--	--	--	--	--		
P-2	Sidewalk Area south of northern building		P-2	0.01	0.93	5.00	0.009	8.82	0.08													
P-3	Picnic Area and Central Site		P-3	0.14	0.91	5.00	0.130	8.82	1.15													
P-4	Container Plaza		P-4	0.04	0.88	5.00	0.039	8.82	0.34													
P-5	South Sidewalk & structure		P-5	0.03	0.68	5.00	0.020	8.82	0.18													
P-6	West Side of Site		P-6	0.09	0.61	7.64	0.056	7.76	0.43													
P-7	East side of Container Plaza		P-7	0.01	0.93	5.00	0.011	8.82	0.09													
P-Total	Total Site	P-1	P-Total	0.40						5.00	0.32	8.82	2.86									

- (1) Basin Description linked to C-Value Sheet
(2) Basin Design Point
(3) Enter the Basin Name from C Value Sheet
(4) Basin Area linked to C-Value Sheet
(5) Composite C linked to C-Value Sheet
(6) Time of Concentration linked to C-Value Sheet

- (7) =Area x Runoff Coeff
(8) =28.5*P/(10+t_c)*0.786
(9) =C.A. x IN/HR
(10) =Column 6 + Column 21
(11) Add the Basin Areas (7) to get the combined basin AC
(12) =28.5*P/(10+Column 10)*0.786

- (13) Sum of Qs
(14) Additional Street Overland Flow
(15) Additional Street Overland Flow
(16) Design Pipe Flow
(17) Pipe Slope
(18) Pipe Size

- (19) Additional Flow Length
(20) Velocity
(21) =Column 19 / Column 20 / 60

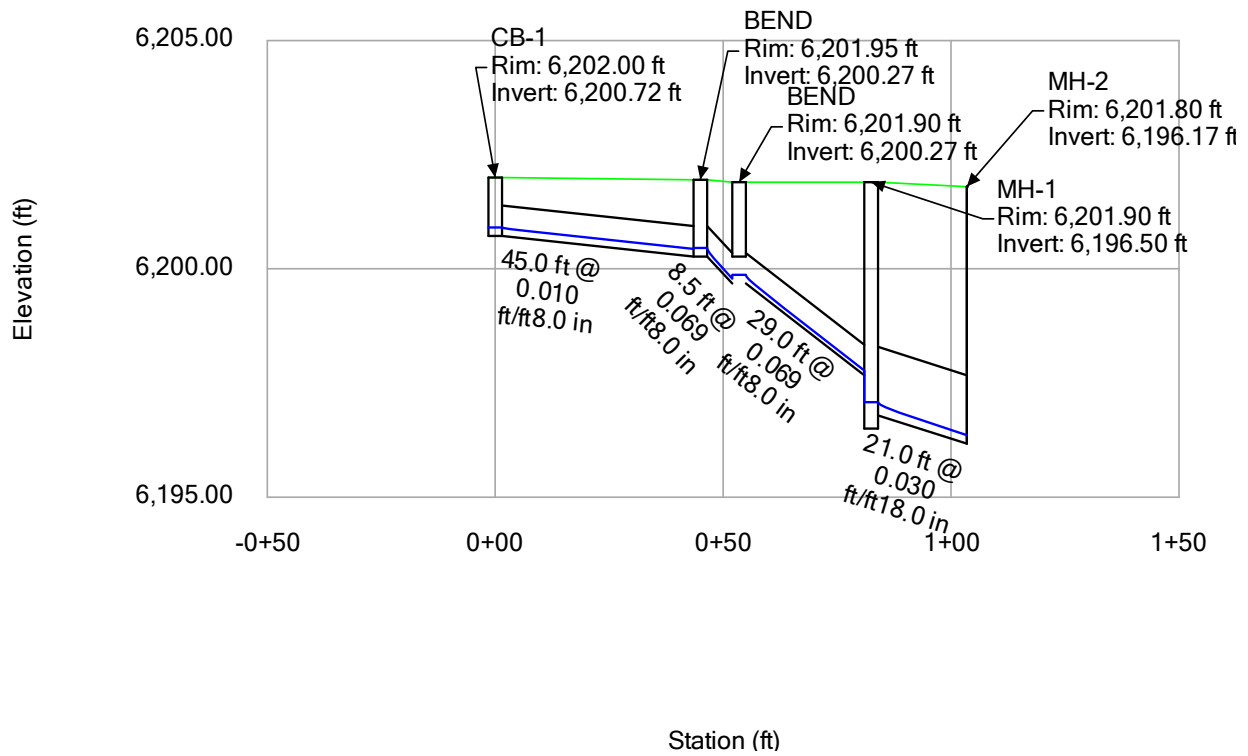


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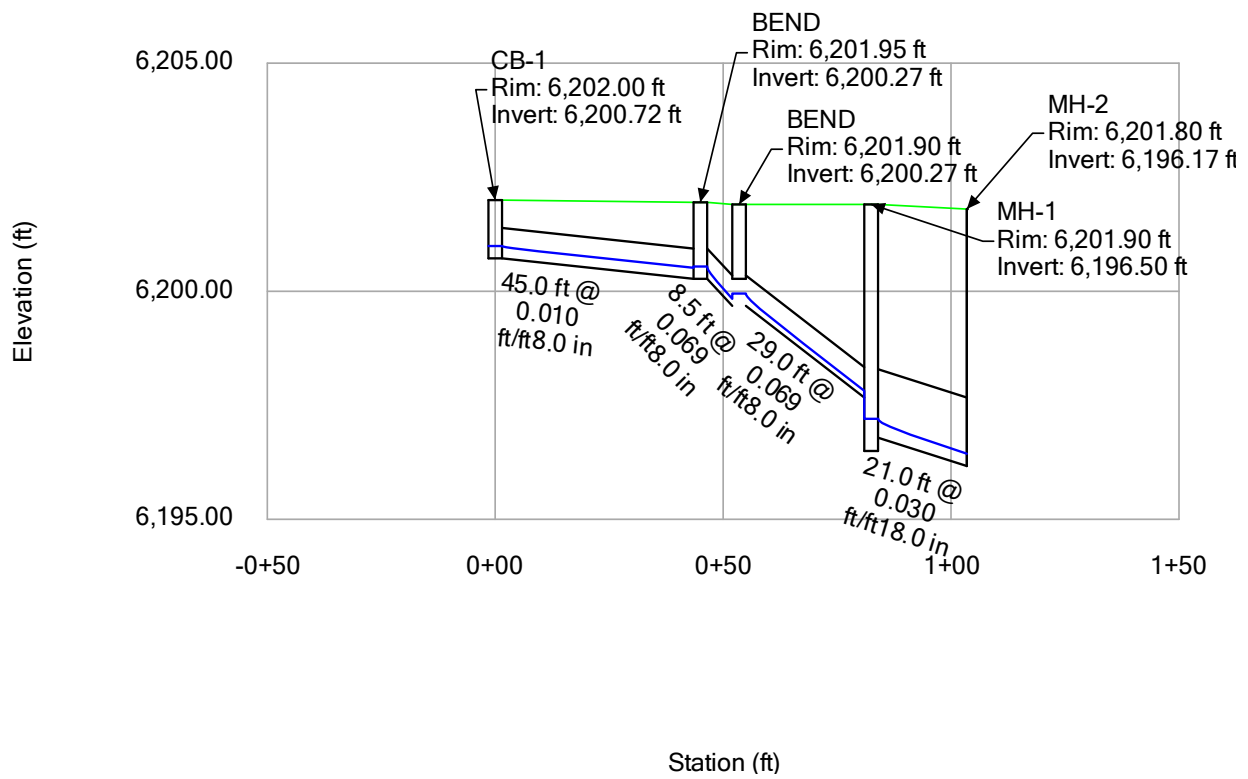
APPENDIX C

Hydraulic Calculations

Profile Report
Engineering Profile - Profile - **5-YR STORM**



Profile Report Engineering Profile - Profile - **100-YR STORM**



DURASLOT[®] Inlet Hydraulics

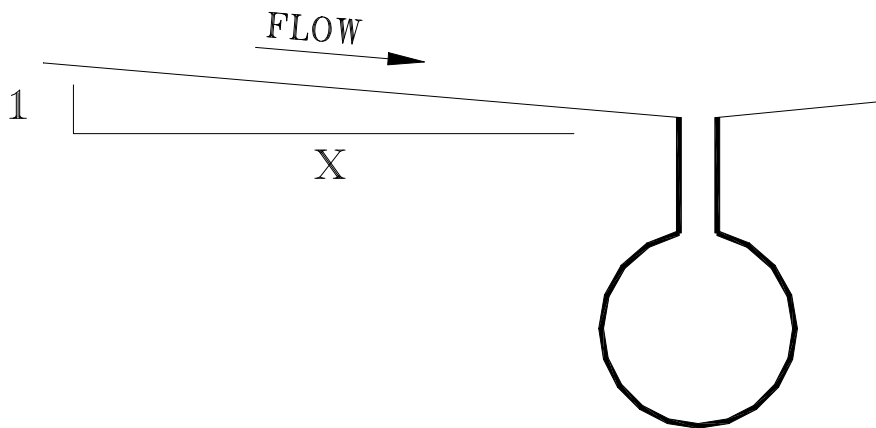
DURASLOT surface drains have the same inlet hydraulics as that of CSP slotted type drains. A 1 ¼" wide opening runs the length of the pipe and special coupler bands provide for a continuous slot. For curb and gutter applications or flow in a triangular channel, the inlet acts as an orifice and the AISI Handbook¹ method can be used.

In most applications the slot is utilized to intercept sheet flow moving approximately perpendicular to the length of the slot. In this case the slot acts as a weir. Some studies have been done by FHWA and CalTrans for this type of application. While exact inlet capacity (or an equation to describe it) is not available for all situations, a 'rule of thumb' has evolved. For conditions where sheet flow velocity is not extremely high (an exception would be a steep slope down to the slot), a slotted inlet of this type will handle a minimum of 0.04 cfs/foot of slot length.

This rule of thumb has been verified by independent testing commissioned by Hall Construction Products and Services (predecessor to Duraslot, Inc.). Three tables on the next page show inlet capacity in cfs/foot of inlet for three conditions:

- 1) 1 ¼" wide slot with standard ½ - #13 galvanized steel grate;
- 2) 1 ¼" wide slot with open top;
- 3) 1 ¼" wide slot with standard ½ - #13 galvanized steel grate (on 4" diameter pipe).

The basic geometry of the testing layout – Grade = X:1



¹ American Iron and Steel Institute – Handbook of Steel Drainage and Highway Construction Products, 5th ed., 1994, pages 218-223.

1 ¾" slot with standard grate (6" dia. Thru 36" dia.)

Grade (inches:inches)	Flow (cfs/foot of slot)
48:1	0.055
32:1	0.050
24:1	0.046
16:1	0.042
12:1	0.041

1 ¾" slot with open top slot (highways, etc. w/o pedestrians)

Grade (inches:inches)	Flow (cfs/foot of slot)
48:1	0.071 +
32:1	0.070
24:1	0.065
16:1	0.061
12:1	0.058

+ This grade resulted in a flow rate that exceeded the maximum rate of the test apparatus.

1 ¼" slot with standard grate (4" dia. only)

Grade (inches:inches)	Flow (cfs/foot of slot)
48:1	0.046
32:1	0.041
24:1	0.037
16:1	0.034
12:1	0.032

All of the above data is for sheet flow at the designated grade flowing in a direction approximately perpendicular to the slot.



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APPENDIX D

MS4 Compliance Summary



Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name Perry Street Social

Project Owner Perry Street Collective LLC

Project Location NEC of 4th Street and Perry Street

ToCR Project Number SDP23-0019

Total Site Area 0.40 acres **acres**

Total Size of Common Plan of Development 0.40 Acres **acres**

Check all that apply:

☒ **Project within Plum Creek Basin**

☐ **Project within Cherry Creek Basin**

Estimated construction completion date September 2023

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

- ☐ WQCV standard
- ☐ Pollutant removal standard
- ☐ Runoff reduction standard
- ☐ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
- ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
- ☐ Constrained redevelopment sites standard
 - Imperviousness of existing site _____ / _____ (Imp. Ac/Site Ac) = _____ %
 - Variance required TCV No. _____
- ☐ Existing control measure with WQCV per previous criteria standards
 - Reference Construction Permit No. _____
- ☐ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3
- ☒ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☒ No

i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

☐ Pavement management site

Excluded impervious area: _____ acres

☐ Excluded roadway redevelopment

Excluded impervious area: _____ acres

☐ Excluded existing roadway areas

Excluded impervious area: _____ acres

☐ Above ground and below ground utilities

☐ Large lot single family home

☐ Non-residential and non-commercial infiltration

Excluded impervious area: _____ acres

☐ Land disturbance for land to remain undeveloped

Excluded impervious area: _____ acres

☐ Stream Stabilization Sites

Excluded impervious area: _____ acres

☐ Trails

Excluded impervious area: _____ acres

☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres

Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☒ No

If yes, complete the following:

Excluded area: _____ acres

Excluded impervious area: _____ acres

Total Site area: _____ acres, _____ % site excluded

Total Impervious area: _____ acres, _____ % impervious excluded



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APPENDIX E

Permanent Water Quality Certification

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

Project: Perry Street - South Street Social		CRW# SDP23-0019		Applicant:
Section	Questions	Response	Check those that apply	Instructions
1	Non-applicable Sites			
	Will the project result in a temporary disturbance of greater than one acre?	No	☒	Proceed to next line.
		Yes	☐	Proceed to section 2.
	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No	☒	Proceed to next line.
		Yes	☐	Proceed to section 2.
	Is the project within the Cherry Creek Watershed?	Yes	☐	Exclusions do not apply. Permanent water quality is required per Control Regulation 72.7.
		No	☒	Permanent water quality is not required. No further action is required.
2	Applicable Site Types and Exclusions by Variance			
	Does the project have more than 35% impervious area on the existing site?	No	☐	Project is an applicable Development Site. Proceed to section 3.
		Yes	☐	Proceed to next line.
	Does the project have greater than 75% impervious area on the existing site?	No	☐	Project is an applicable Redevelopment Site. Proceed to section 3.
		Yes	☐	Proceed to next line.
	Will 100% of the runoff from the existing and proposed site be captured and treated for permanent water quality?	Yes	☐	Document in drainage report. No further action required.
		No	☐	Proceed to next line.
	Do any other water quality exclusions apply to the site?	No	☐	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> .
		Yes	☐	Proceed to next section. Following approval of other variances, design remaining site in accordance with Constrained Redevelopment standards and apply for variance for <u>Constrained Redevelopment Sites</u> .
3	Applicable Sites with Other Exclusions by Variance			
3.1	Category 1: Roadways, bridges and trails only			
3.1.1	Is the project a bike or pedestrian trail?	Yes	☐	Proceed to next line.
		No	☐	Proceed to 3.1.2.
	Is the trail for a roadway?	Yes	☐	Proceed to 3.1.2.
		No	☐	Project is excluded. Submit variance for <u>Trails Excluded from Permanent Water Quality Requirements</u> .
3.1.2	Is the project primarily used for parking or access to parking?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No	☐	Project is excluded. Submit variance for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	Proceed to 3.1.4.

3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No	☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No	☐	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No	☐	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	This exclusion does not apply. Permanent water quality is required.
3.2	Category 2: Non-residential and non-commercial projects only			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes	☐	Project is excluded. Submit variance for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> .
		No	☐	Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes	☐	Project is excluded. Submit variance for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> .
		No	☐	Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes	☐	Project is excluded. Submit variance for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> .
		No	☐	Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes	☐	Project is excluded. Submit variance for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> .
		No	☐	Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	☐	Project is excluded. Submit study along with variance for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	This exclusion does not apply. Permanent water quality is required.
3.3	Category 3: Residential and Commercial projects			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes	☐	Proceed to next line.
		No	☐	Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No	☐	Project is excluded. Submit variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	Proceed to next line.
	Is the project site greater than 20% impervious?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	☐	Project is excluded. Submit study along with variance for <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	☐	This exclusion does not apply. Permanent water quality is required.

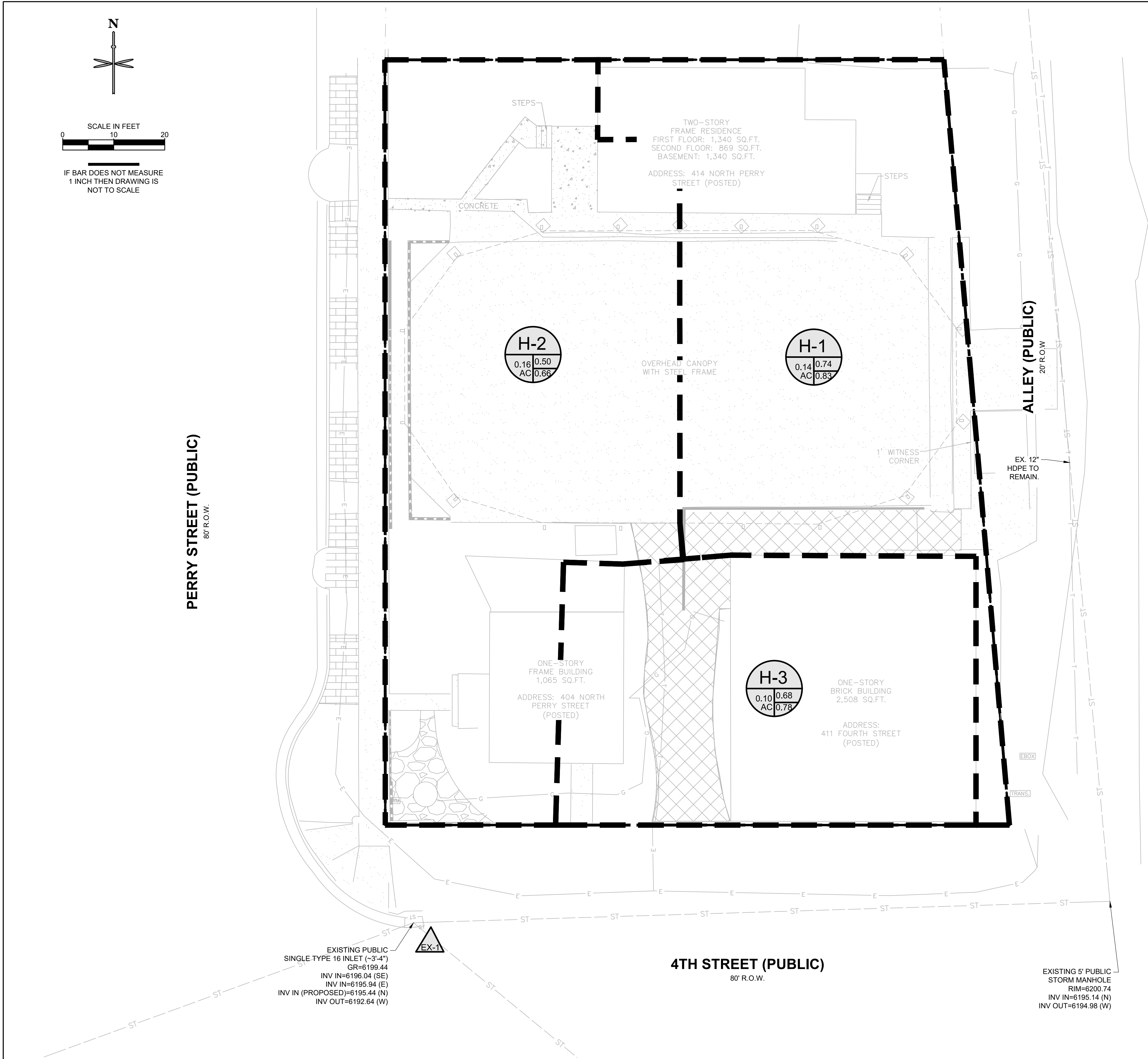
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes	☐	This portion of the project is excluded. Submit variance for <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
		No	☐	Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes	☐	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No	☐	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the drainage report . No further action is needed.
		Yes	☐	This exclusion does not apply. Permanent water quality is required.



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APPENDIX F

Drainage Maps



HISTORIC DRAINAGE LEGEND

- PROPERTY BOUNDARY
- EXISTING EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- HISTORIC BASIN DELINEATION
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND COMMUNICATION
- EXISTING GAS
- EXISTING STORM INLET AND MANHOLE
- HISTORIC DRAINAGE FLOW ARROWS
- DESIGN POINT
- BASIN DESIGNATION
- 5-YEAR RUNOFF COEFFICIENT
- 100-YEAR RUNOFF COEFFICIENT
- BASIN AREA IN ACRES

HISTORIC RUNOFF SUMMARY TABLE							
DESIGN POINT	TRIBUTARY BASIN	AREA (AC)	PERCENT IMPERVIOUS	COEFFICIENT		TOTAL RUNOFF	
				C5	C100	Q5 (CFS)	Q100 (CFS)
1	H-1	0.14	87%	0.74	0.83	0.49	1.00
	H-2	0.16	60%	0.50	0.66	0.40	0.95
	H-3	0.10	81%	0.68	0.78	0.32	0.68
Total Existing Parcel		0.40	74%	0.62	0.73	1.21	2.62



**Know what's below.
Call before you dig.**

CALL UTILITY NOTIFICATION
CENTER OF COLORADO

1-800-922-1987 or 811

CALL 3-BUSINESS DAYS (NOT INCLUDING INITIAL DAY OF CONTACT) IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

PROJECT BASIS OF BEARING

BASED ON THE NORTH LINE OF LOT 4A, BLOCK 11 OF THE TOWN OF CASTLE ROCK. SAID LINE BEARS NORTH 89° 58' 45" EAST, AND IS MONUMENTED AT THE WEST END BY A CHISELED "X" AND IS MONUMENTED AT THE EAST END BY A 1/2" REBAR WITH RED PLASTIC CAP STAMPED "LS6935".

PROJECT BENCHMARK

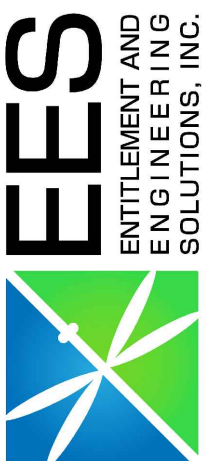
ELEVATIONS ARE BASED ON NGS POINT NO. 336 BEING A BENCHMARK DISK IN A GRANITE BOULDER AT THE FOOT OF A ROCK OUTCROP LOCATED 29 FEET SOUTH OF THE EAST ONE OF THREE LARGE PINE TREES AND 10 FEET ABOVE THE LEVEL OF THE HIGHWAY. ELEVATION = 6571.41 FEET (NAVD88 DATUM)

BY

DATE

REVISION

No.



EES
ENTITLEMENT AND
ENGINEERING
SOLUTIONS, INC.
501 S Cherry St, Suite 300
Denver, CO 80246
303-572-7997 www.ees.us.com



PUBLIC IMPROVEMENT CONSTRUCTION PLANS

PERRY STREET SOCIAL DISTRICT

414 N. PERRY ST., 405 N. PERRY ST & 411 N. 4TH ST. CASTLE ROCK, CO 80104

EXISTING DRAINAGE MAP

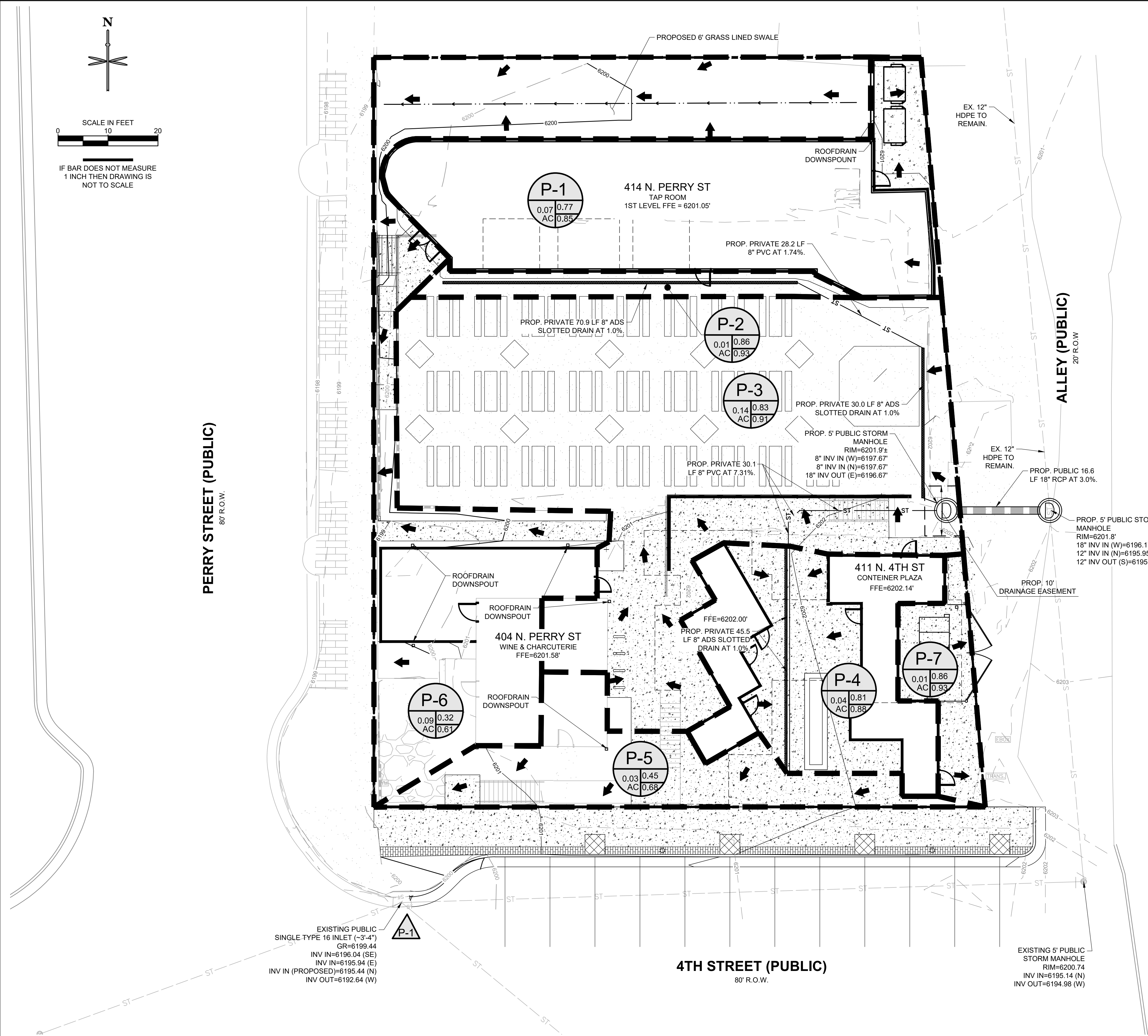
PROJECT NO: PER001.01

DESIGNED BY: KMH

DRAWN BY: KMH

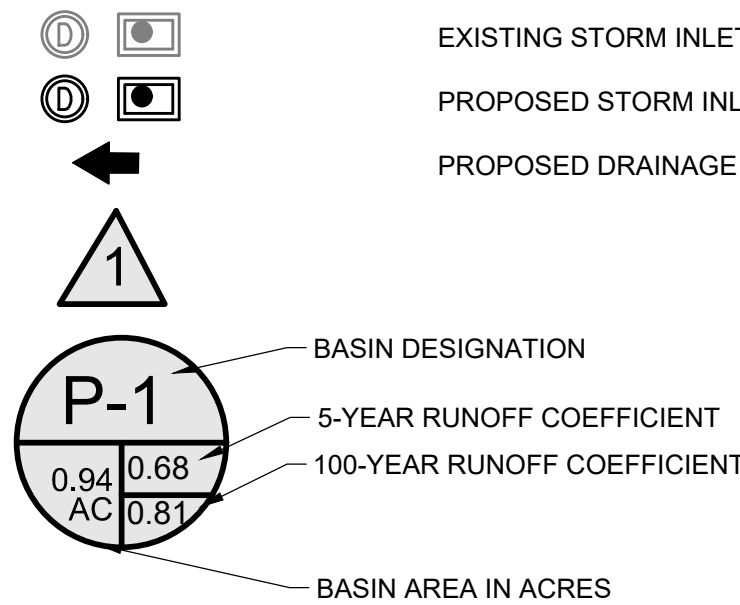
DATE: 01/06/2023

DR-01



DEVELOPED DRAINAGE LEGEND

- PROPERTY BOUNDARY
- EXISTING EASEMENT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED BASIN DELINEATION
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND COMMUNICATION
- EXISTING GAS
- PROPOSED STORM SEWER
- EXISTING STORM INLET AND MANHOLE
- PROPOSED STORM INLET AND MANHOLE
- PROPOSED DRAINAGE FLOW ARROWS



PROPOSED RUNOFF SUMMARY TABLE							
DESIGN POINT	TRIBUTARY BASIN	AREA (AC)	PERCENT IMPERVIOUS	COEFFICIENT		TOTAL RUNOFF	
				C5	C100	Q5 (CFS)	Q100 (CFS)
P-1	P-1	0.07	91%	0.77	0.85	0.26	0.53
	P-2	0.01	100%	0.86	0.93	0.04	0.08
	P-3	0.14	97%	0.83	0.91	0.57	1.15
	P-4	0.04	95%	0.81	0.88	0.17	0.34
	P-5	0.03	54%	0.45	0.68	0.07	0.18
	P-6	0.09	38%	0.32	0.61	0.12	0.43
	P-7	0.01	100%	0.86	0.93	0.05	0.09
Total Proposed Parcel		0.40	76%	0.65	0.79	1.30	2.86

CALL UTILITY NOTIFICATION
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PROJECT BASIS OF BEARING

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PROJECT BENCHMARK

ELEVATIONS ARE BASED ON NGS POINT NO. 336 BEING A BENCHMARK DISK IN A GRANITE BOULDER AT THE FOOT OF A ROCK OUTCROP LOCATED 29 FEET SOUTH OF THE EAST ONE OF THREE LARGE PINE TREES AND 10 FEET ABOVE THE LEVEL OF THE HIGHWAY. ELEVATION = 6571.41 FEET (NAVD88 DATUM)

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PUBLIC IMPROVEMENT CONSTRUCTION PLANS

PERRY STREET SOCIAL DISTRICT

PROPOSED DRAINAGE MAP

PROJECT NO: PER001.01
DESIGNED BY: KMH
DRAWN BY: KMH
DATE: 01/06/2023

DR-02